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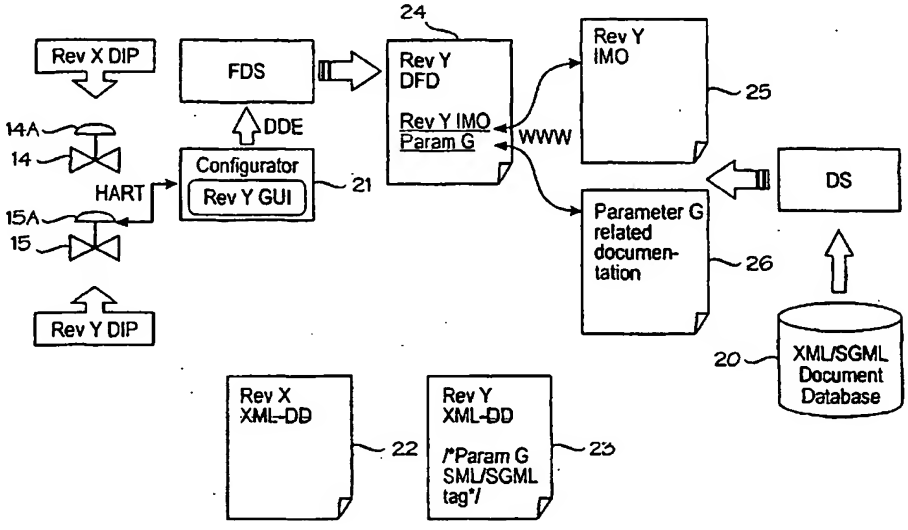
(54) Title: DEVICE DOCUMENT MANAGEMENT IN AUTOMATION SYSTEM



(57) Abstract: Documentation pertaining to intelligent field devices (14, 15) is maintained in digital format in a centralized document server (DS) for a number of automation systems. The field devices (14, 15) contain document identification information (DIP) stored in them to unambiguously identify the device documentation pertaining to each field device. The identification information can be read using a field device configurator (21) for configuring and controlling field devices in an automation system over a two-way fieldbus. When the user of the configurator (21) wishes to obtain device documentation pertaining to a specific field device, the configurator (21) provides a field document server (FDS) residing in each automation system with one or more DIP parameters read from the field device. The field document server retrieves electronic documentation describing the field device identified by the DIP parameter(s) for display by the configurator user interface.

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DEVICE DOCUMENT MANAGEMENT IN AUTOMATION SYSTEM

FIELD OF THE INVENTION

[0001] The invention relates to the management of device documents relating to intelligent field devices of automation systems.

BACKGROUND OF THE INVENTION

[0002] In industrial processes, field devices usually include regulating devices, control devices, transducers, measuring transmitters, and other similar devices directly connected to the process. A single process may comprise hundreds of such field devices. A typical field device is a control valve provided with a valve controller, such as the valve controller ND800 of Metso Automation Oy. Devices known as intelligent field devices are provided with a control logic or software which makes it possible to control the field device locally for example by means of a suitable control algorithm, to collect status and measurement data, and/or to communicate with a field device management system by means of a field communication protocol, such as HART (Highway Addressable Remote Transducer). In addition, intelligent field devices already comprise a sufficient amount of diagnostics to allow them to indicate their malfunction. Typical field device management systems are PC programs provided with a graphical user interface and comprising the following characteristics: field device configuration, configuration database, field device condition monitoring based on status data received from the field device, and field device status database. An example of a commercial field management system is the Field Browser and Valve Manager of Metso Automation.

[0003] There are usually several revisions of one field device type (such as the ND800) in a factory or plant. The devices are functionally different from one another and therefore they also have revision-specific IMOs (Installation, Maintenance and Operating instructions). The management and use of revision-specific instructions is laborious and liable to errors, irrespective of whether the instructions are on paper or in an electronic form. The fact that automation systems contain field devices of various equipment suppliers further accentuates the problem.

[0004] The current state-of-the-art practice is to configure field devices by using what is known as a device description language and user interface software supporting the language. The device description language is revision-specific (and manufacturer-specific), and it describes the parameters

of the field device, the parameterization mechanism and the method of presentation of the parameters, on the basis of which configuration software capable of understanding the field description language, or generally a configurator, is able to build a user interface that allows the device to be configured. However, device documentation, such as instructions for installation, maintenance and operation, cannot be included in the device description language. The user of the configurator therefore has to employ other means to obtain the device documentation.

A SUMMARY OF THE INVENTION

[0005] It is an object of the invention to provide a management system for intelligent field device documents that alleviates or overcomes the above problems.

[0006] This is achieved by means of a document management system for intelligent field devices of automation systems, an automation system, and an intelligent field device as disclosed in claims 1, 2 and 14, respectively.

[0007] In accordance with the invention, documentation relating to intelligent field devices, and possibly to peripheral devices thereof, is maintained in digital format in a single centralized document server for a plural number of (two or more) automation systems. The centralized document server is typically maintained by the manufacturer of the field device in question and located in the premises of the manufacturer, i.e. at a distance from the automation systems. The database of the document server may also be replicated into a corresponding document server located at the factory, whereby problems relating to interruptions or delays in the Internet connection, for example, are avoided. Preferably, the documentation relating to all the field devices of the manufacturer can be taken care of globally, using a single document server, over telecommunications networks. The field devices contain document identification information stored in them, the information unambiguously identifying the device documentation relating to each field device, and possibly to the peripheral devices thereof. The identification information may be any information suitable for document identification, herein generally referred to as document identifier parameters (DIP). DIP parameters are preferably identification codes. The parameters can be read by means of a field device configurator, which can be used for configuring or controlling the

field device over a two-way fieldbus available in the automation system, for example. The configurator may also be a terminal device that has a two-way connection to the field device. According to an embodiment of the invention, when the operator of the configurator wishes to obtain device documentation relating to the field device, the configurator reads one or more DIP parameters from the field device and supplies it/them to the retrieval program of the automation system. The retrieval program then retrieves electronic documentation describing a field device identified by the DIP parameter(s), or a particular characteristic of the device, for display by the configurator user interface. If the configurator is a telecommunications network terminal provided with a browser and direct access to information networks, it may carry out the document retrieval directly.

[0008] Although in this field device documentation management system the responsibility for field device documentation management is transferred to the supplier of the field devices, at the same time the system reduces the processing and logistics costs associated with the documentation. The supplier of the field devices maintains the device documentation in a centralized manner in a document server, which may function at the same time as part of a product information management system. The device documentation is safely stored in the document server. According to an embodiment, clients having an Internet connection or a similar data transfer connection to the document server of the field device supplier automatically have the latest, updated device documentation at their disposal. Document identification based on DIP parameters allows the personnel of the automation systems to always automatically obtain the device documentation associated with exactly the correct device type and revision. Complaints associated with the documentation of intelligent devices drops to zero. If the field device (such as a control valve) is assembled by the supplier, DIP parameters associated with its peripheral devices (such as an actuator, valve, limit switches) can be stored in the field device already during the manufacture, which creates added value for the supplier's all-in-one deliveries and adds to their sales.

[0009] According to an embodiment of the invention, the configurator comprises a browser which allows the user to view electronic field device documents and to process them. According to yet another embodiment of the invention, the configurator is provided with a field device document created in XML, SGML, HTML or similar, browser-readable description

language format. This enables the use of common browser programs in the configurator. The documentation in the centralized document server is preferably stored in XML, SGML or HTML format, or in some other similar language description format. In a preferred embodiment of the invention, the documentation is in XML or SGML format. XML/SGML enables a context-based textbase to be built. On the basis of what are known as XML/SGML tags, documentation associated with a particular subject matter or IMOs of a specific type, which can also be produced on paper when desired, can then be compiled from the textbase. XML/SGML-based device documentation is also significantly easier to manage and maintain than documentation produced using conventional tools (Word, Excel, etc.) If the description language supported by the configurator is not compatible with the language of the document server, the document can be subjected to an XML-HTML conversion, for example.

[0010] According to yet another embodiment of the invention, there are device description files stored in the configurator that define characteristics of field devices. The device description file of a field device comprises a tag created in XML or SGML format, or in a similar description language format, in connection with at least one file object, the tag including a link to corresponding device documentation residing in the centralized document server. According to an embodiment, by activating the link the user can make the configurator request the corresponding documentation from the centralized document server by using the above means. The tags included in the device description file may be associated with any characteristic or parameter described in the file and therefore they allow the user to retrieve the documentation pertaining exactly to the desired characteristic or parameter.

[0011] According to an embodiment of the invention, the retrieval means consist of field device document servers provided in each automation system. The configurator uses the document identifier information of a field device to request for a device document page from the server which then retrieves the documentation needed for creating the document page from the centralized document server over a public telecommunications network. According to yet another embodiment, the field document server responds to the document request by generating first a dynamic field device document page comprising links to the documentation in the centralized document server. When the user of the configurator activates a link included in the

dynamic field device document, the field document server retrieves the documentation associated with the activated link from the centralized document server for presentation. The field device document server preferably creates the links by including in the document at least one tag from the field device description file identified on the basis of the identifier information provided by the configurator. The dynamic device document page can thus be made highly context-specific before the centralized document server has even been contacted. The dynamic device document page, which is for example in XML/SGML or HTML format, and the links therein enable carefully targeted queries to be made to the document server, which reduces the amount of information to be transferred and speeds up the retrieval. The field document server may also add identification information to a query, the information allowing to identify the user and to prevent unauthorized access to the information of the service provider residing in the centralized document server.

[0012] In the following, the invention will be described in greater detail with reference to the preferred embodiments and the accompanying drawings, in which

Figure 1 shows a field device management system connected to a process automation system of a factory;

Figure 2 is a schematic diagram illustrating components in a document management system according to a first preferred embodiment of the invention, their interaction and the documents created;

Figure 3 illustrates a context-based retrieval employing DIP parameters and DD files; and

Figure 4 illustrates a retrieval based on field devices.

[0013] The present invention can be applied to all industrial processes, or the like, comprising intelligent field devices. In this context, the term 'intelligent field device' refers to any device associated with a process or an automated system that can be controlled and the status of which can be monitored, or to the control thereof. A typical intelligent field device of this kind is a valve controller in a control valve.

[0014] Figure 1 shows a schematic block diagram of a process automation system and a field device management system of the invention connected thereto. The automation system consists of control room programs and databases 11, and process control programs and an I/O part 12. The control and I/O part 12 is connected to intelligent field devices according to the

4-20 mA standard, the devices in this case consisting of control valves 14, 15 and 16 and valve controllers 14A, 15A and 16A. The valve controller may be for example the ND800 of Metso Automation Oy. In this case the intelligent field devices are capable of digital communication carried out according to the HART (Highway Addressable Remote Transducer) protocol, which is based on transmitting digital data at the same time with a conventional analog 4-20 mA signal. HART enables two-way communication which for controlling intelligent field devices and for reading information from them. The HART protocol conforms to the reference model of the OSI (Open System Interconnection) protocol stack, developed by the International Organization for Standardization (ISO). HART commands are transferred in layers 7 (application layers). A HART instruction set comprises universal commands that all field devices understand, and device-specific commands providing functions restricted to an individual device (device type). The HART protocol enables both a point-to-point configuration, in which each field device is connected to a master unit by a separate bus (wire pair), and a multidrop configuration, in which one fieldbus (wire pair) may be connected to as many as 15 field devices. The HART protocol is described in greater detail for example in the publication HART Field Communication Protocol: An Introduction for Users and Manufacturers, HART Communication Foundation, 1995. The HART protocol has also been developed into an industrial standard. Examples of other fieldbuses include Fieldbus and Profibus. However, it is to be understood that the type or implementation of the field communication interface, i.e. the fieldbus and the protocol it employs, is not relevant to the present invention.

[0015] The field devices are managed using a field device management system 10. Each field device 14, 15 and 16 has a dedicated fieldbus connecting it to a conventional HART multiplexer 9, which is in turn connected over an RS-485 bus 8 to a workstation 6, such as a PC running for example on Windows 95/98 or Windows NT user interface. The workstation 6 is further connected to a local area network LAN of the factory, which allows it to communicate with the control room programs, for example.

[0016] The configuration of the field devices (parameter setting) is carried out using what is known as a device description language and a user interface software supporting the language. The language is device-revision-specific (and manufacturer-specific) and it describes the parameters of the field device, the processing of the parameters and their method of presentation, on

the basis of which a configuration program understanding the device description language, or generally a configurator, is capable of building a user interface for the device.

[0017] In the first preferred embodiment of the invention, the workstation 6 is provided with field device configuration software for configuring and controlling the field devices 14, 15 and 15 over a fieldbus. It is also possible that there are several configuration programs, even one for each field device type or device revision. Different configurators are typically provided at least for the field devices of different field device manufacturers. There are also so-called universal configurators, which support the devices of a number of manufacturers and even various communication protocols. Alternatively, or in addition, the configurator program or programs may be located in a control room, in connection with the control room software, or in some other workstation. Further, the configurator may be a portable configurator provided with a wired or wireless connection to the factory-LAN and/or to the fieldbus, or to the automation system in general. In this specification, 'configurator' refers generally to any program or device that can be used for configuring field devices.

[0018] The workstation 6 is also connected to a database 4 where description files of the field devices and possibly other information relating to the field devices and their management is stored. The database is usually part of the configurator. The device description files can be read using the configurator. However, the location of the stored device description files in the automation system is not relevant to the invention as long as the configurator has access to the files.

[0019] The factory-LAN is also connected to a field document server FDS which, in turn, is connected to a public telecommunications network, such as the Internet. The server FDS may be connected to the Internet directly, or the connection may be arranged via the factory-LAN and a router, or over some other gateway.

[0020] There are preferably several, or many, automation geographically separate systems of Figure 1. Each one of them is capable of using the field document server FDS to communicate with the centralized document server DS of the field device manufacturer over the Internet, as illustrated in Figure 2.

[0021] The document server DS is connected to a database 20,

which contains XML/SGML format installation, maintenance and operating instructions for intelligent field devices and their peripherals (such as actuators and valves). The XML/SGML language enables a context-based text database to be built, from which database documentation pertaining to a specific subject matter or IMOs of a specific type, such as IMOs for a positioner, can be can be compiled on the basis of what are known as XML/SGML tags.

[0022] The document server DS is located in the local area network of the field device supplier and therefore the database 20 is easy to update and the device documents therein are always up-to-date. The document server DS may be further connected to the Internet, with a firewall in between, for example. The document server DS is provided with a program that creates the device document, or a part of it, in the form of an XML/SGML page on the basis of the information, such as an XML/SGML tag, contained in a document request received from the field document server. The device documentation can also be generated in HTML format, in which case an XML/SGML-HMTL conversion program is needed. An example of commercially available programs of this kind is the Dynaweb.

[0023] The manufacturer delivering an intelligent field device configuration provides the device with a set of document identification parameters DIP that unambiguously identify the documentation associated with the field device, and possibly with its peripheral devices as well, the documentation being then stored in the database 20. For example, when a control valve is to be delivered, DIP parameters relating to the valve positioner can be set at the factory of the device manufacturer to identify the device documentation and the device description file pertaining to the positioner, actuator and valve. For example, the following DIP parameters can be used. If the delivery only involves a positioner, DIP parameters relating to peripheral devices are not set at the factory. It is to be noted that the DIP parameters can take any form, the examples given herein being not meant to restrict the invention.

[0024] Each intelligent field device supplied by the device manufacturer comprises a device description file. The manufacturer may expand the device description to also include XML/SGML tags for each description file object. The objects in question may comprise parameters, menus and methods. To enable the device description file to be registered for use by universal configuration programs, the XML/SGML tags must be added

into comment fields. The tags function as links, and the activation of a link initiates a retrieval of the document associated with the corresponding device description file object in the field document server FDS (which further retrieves the document from the document server DS). This enables a context-based document (operating instructions) associated with the device description file to be provided, i.e. the user may open only the operating instructions associated with the device description file in question, instead of opening the entire set of instructions. An XML-extended device description file XML-DD can also be used for generating a dynamic document page in the field document server FDS, as will be described below. However, it is to be noted that the XML-DD is not compulsory for the operation of the management system of the invention, but an additional feature thereof. The following is an example of an extended device description file of a Hart fieldbus, the file showing an XML tag in bold type

```
{
CLASS DEVICE;
TYPE FLOAT
}
DISPLAY_FORMAT "5.2f";
}
HANDLING READ & WRITE;
LABEL "position gain";
        HELP "Position control gain value. The higher gain
results to faster response. [For more information on the position
control gain value, click here]".
}
```

[0025] The XML tag is in the comment field and the HART device description file can thus be read using a universal configurator. However, only a configurator or a field document server FDS supporting XML can make use of the XML tag for obtaining the additional documentation.

[0026] Let us then examine an example of an embodiment of the invention for generating a device document for a user. Figure 2 shows two intelligent control valves consisting of valves 14 and 15 and positioners 14A and 14B. The positioners 14A and 15A represent different device revisions Rev X and Rev Y, which are therefore provided with different DIP parameters Rev X DIP and Rev Y DIP, which have been included in the positioner

configurations at the manufacturer's factory. The positioners 14A and 15A are connected to a configurator 21 over a HART bus. In database 4 are stored XML-extended device description files Rev X XML-DD and Rev Y XML-DD of the positioners 14A and 15A. Assume that user is using a configurator 21 to configure the positioner 15A and the valve 15. The configurator 21 has retrieved the device description file Rev Y XML-DD from the database 4 and used it to create a user interface Rev Y GUI corresponding to the device revision Y. In addition, the configurator has read the DIP parameters Rev Y DIP from the positioner 15. Assume further that the user wishes to obtain more specific device documentation and uses the configurator 21 to request for this information from the field document server FDS. For this purpose, a dynamic connection is set up between the field document server FDS and the generic configuration program 21, i.e. the DIP parameters are linked using for example a Windows DDE mechanism, or the like, such that the FDS knows which field device the documentation is to relate to. There are not many DIP parameters for a single device and, regardless of the device, the number of the parameters, and thereby also the DDE links, may remain constant. The field document server FDS generates a dynamic XML or SGML device document page, i.e. a DFD page 24, on the basis of the DIP parameter values received from the field device. In Figure 2, the DFD page 24 is generated for the field device revision Rev Y on the basis of the parameters Rev Y DIP. The DFD page 24 comprises hyperlinks to the device documentation residing in the document server of the field device supplier. In Figure 2, the DFD page comprises hyperlinks *Rev Y IMO* and *Param G*. The former hyperlink refers to operating instructions (IMO) 25 of the field device revision Rev Y that reside in the document server DS. The latter hyperlink refers to documentation 26 associated with parameter G and located in the document server DS. The format of the DFD page may be "standardized" according to device type (transmitter, valve), and the information about its layout and contents is kept in the server FDS.

[0027] If an XML-extended device description file is available, such as an XML-DD file 23 for the field device 15A, device description file objects identified by the DIP parameters and comprising links to the document server of the field device manufacturer can be retrieved from the database 4 by the FDS and included into the generated DFD page 24. The XML-DD file 23 of Figure 2 comprises an XML/SGML tag associated with parameter G which

may be included in the DFD page 24.

[0028] The user can read the DFD page by using for example an XML or SGML browser connected to the configurator 21. When the configurator 21 consists of software to be executed in the workstation 6, the browser is typically provided in the form of separate browser software that is activated from the configurator program, for example when the user activates the speech mode of the device document. It is to be noted that since the DFD page 24 is generated in the server FDS connected to the factory-LAN (the factory-Intranet), the page can be accessed using any XML/SGML browser in the network. In other words, the browser does not necessarily need to reside in the configurator or in the same workstation as the configurator. The DFD device document page can also be generated in HTML format or converted into HTML format, after which it can be studied using any HTML browser.

[0029] When the browser displays the DFD page to the user, the user may apply the hyperlinks to request for the desired documentation. If the user uses the browser to activate the hyperlink *Rev Y IMO* on the DFD page 24, the field device server FDS contacts the document server DS over the Internet, the DS responding by sending an XML or SGML page 25 that contains the IMO documentation pertaining to the device revision Y. The FDS forwards the page to the browser, which displays it to the user. Correspondingly, if the user activates the hyperlink *Param G*, the FDS retrieves an XML/SGML page 26 from the DS, the page containing the documentation associated with parameter G.

[0030] Context-based retrieval employing DIP parameters and DD files is also illustrated in Figure 3. The device documents stored in the document server DS comprise identification data which shows the type of the device and the document revision (e.g. ND820 – Rev2.0 – IMO). The document identifier may function as the main tag in a document of the XML format and it is stored in devices (such as EEPROM) associated with the document in question. In Figure 3, for example, the DIP identifiers stored in the EEPROM of a field device are "ND820 – REV2 – IMO" and "BJ20 – REV1.1 – ASSY", i.e. the main tags of the corresponding documents at the server DS. Context-based retrieval can be carried out using DD files. The correct DD is selected using the DD identifier stored in the device. If documentation relating only to a specific parameter is to be obtained, the DD of the device in question is provided with a tag (e.g. "parametri x XML tagi" in Figure 3). The field

document server FDS generates a dynamic XML or SGML device document page, i.e. a DFD page, using the DIP parameters and the DD file tag received from the field device, as described above in connection with Figure 2. In the example of Figure 3, the DFD page comprises hyperlinks ND820-REV2-IMO and BJ20-REV1.1-ASSY generated on the basis of the DIP parameters of the field device, and a hyperlink PARAMETRI X – TAGI formed of the DD file tag. ND820-REV2-IMO provides a document-based hyperlink to the corresponding document located in the document server. PARAMETRI X – TAGI is a context-based hyperlink that uses the tag to search an XML document (which includes the same tag) for the parameter description, given in text and graphic format, for example. In other words, in context-based retrieval there is no identifier data (i.e. tag) stored in the device.

[0031] Another preferred alternative is to store a tag associated with each parameter or parameter group in the device. In that case a DD-based configurator is not needed for context-based retrieval, but the retrieval can be made using any terminal capable of communicating with the field device and having access to the Internet or an intranet. This is illustrated in Figure 4. The field device comprises a DIP identifier "ND820 – REV2 – IMO" and a tag "parametri x XML tagi". The terminal may be any terminal device linked to the field device. A potential terminal device is a mobile station that has a wireless link, such as a Bluetooth link, to the field device. On the basis of the DIP parameter and the tag read from the field device, the browser of the terminal device generates hyperlinks ND820-REV2-IMO and PARAMETRI X – TAGI, which can be used for carrying out a document-based or, correspondingly, a context-based retrieval in the document server DS, similarly as described above.

[0032] The above embodiments are only meant to illustrate the invention. A person skilled in the art will find it apparent that as technology advances the basic idea of the invention can be implemented in various ways. The invention and its embodiments are therefore not restricted to the above examples, but the invention may vary within the scope and spirit of the accompanying claims.

CLAIMS

1. A system for the management of device documents relating to intelligent field devices of automation systems, which field devices (14, 15) are configurable or readable by means of a configurator (21) over a two-way connection, **characterized** in that the system comprises

a document server (DS) maintaining documentation relating to intelligent field devices, and possibly to peripheral devices thereof, in digital format in a centralized manner for a plural number of automation systems;

document and/or device characteristics identification information (DIP) configured into the field devices, the information identifying unambiguously the device documentation pertaining to each field device and/or its characteristics, and possibly to its peripheral devices, the identification information being readable by means of said configurator (21);

means (FDS), included in each one of said automation systems, for retrieving from the centralized document server (DS) electronic documentation describing a specific field device or a characteristic thereof, in response to said field device document identification information received from the field device (14, 15).

2. An automation system comprising intelligent field devices (14, 15) and a configurator (21) for configuring or reading field devices over a two-way connection, **characterized** in that the automation system further comprises

document and/or device characteristics identification information (DIP) configured into the field device (14, 15), the information unambiguously identifying the device documentation pertaining to each field device and/or its characteristics, and possibly to its peripheral devices, the identification information being readable by means of said configurator;

means for retrieving from a document server (DS) electronic documentation pertaining to a specific field device, or a characteristic thereof, on the basis of the document identification information provided by the field device, the document server maintaining documentation pertaining to the intelligent field devices, and possibly to their peripheral devices, in digital format.

3. A system according to claim 2, **characterized** in that the document server (DS) is configured to maintain the documentation pertaining

to intelligent field devices, and possibly to peripheral devices thereof, in digital format in a centralized manner for a plural number of automation systems, and that the document server can be accessed via a public telecommunications network, such as the Internet.

4. A system according to claim 1, 2, or 3, **characterized** in that the configurator (21) is arranged to configure or read field devices over a two-way fieldbus.

5. A system according to claim 1, 2 or 3, **characterized** in that the configurator is a portable terminal capable of setting up a two-way connection, preferably a wireless connection, to a field device.

6. A system according to any one of claims 1 to 5, **characterized** in that the configurator (21) comprises a browser which allows the user to view and process electronic field device documents.

7. A system according to any one of claims 1 to 6, **characterized** in that the document server (DS) is arranged to store the documentation in XML, SGML or HTML format, or in a similar description language format.

8. A system according to claim 7, **characterized** in that the field device document created at the configurator (21) is a browser-readable document generated in XML, SGML or HTML format, or in a similar description language format.

9. A system according to any one of claims 1 to 8, **characterized** in that

the automation system comprises device description files (22, 23) stored therein to determine the characteristics of a field device;

a field device description file (22, 23) comprises a tag created in XML or SGML format, or in a similar description language format, in association with at least one object of the device description file, the tag comprising a link to corresponding device documentation residing in the document server (DS).

10. A system according to claim 9, **characterized** in that in response to the user activating the link in the device description file, the configurator (21) is arranged to request the corresponding documentation from the centralized document server (DS) by using the retrieval means (FDS).

11. A system according to any one of the preceding claims, **characterized** in that

said retrieval means comprise a field document server (FDS) in each one of said automation systems;

the configurator (21) is arranged to use the field device document identification information to request a device document page from the field document server (FDS);

in response to the document request, the field document server (FDS) is arranged to retrieve the documentation needed for creating the document page from the centralized document server (DS) over the public telecommunications network.

12. A system according to claim 11, **characterized** in that

said retrieval means comprise a field document server (FDS) in each one of said automation systems;

the configurator (21) is arranged to use the field device document identification information to request a device document page from the field device document server (FDS);

in response to the document request, the field device document server (FDS) is arranged to create a dynamic field device document page containing links to the documentation residing in the centralized document server (DS);

in response to the user of the configurator (21) activating a link included in the dynamic field device document, the field device document server (FDS) is arranged to retrieve documentation pertaining to the activated link from the centralized document server (DS).

13. A system according to claim 12, **characterized** in that the field document server (FDS) is arranged to create the links by including into the document the at least one tag that is in the field device description file identified by the identification information received from the configurator.

14. An intelligent field device, **characterized** in that the field device (14, 15) configuration comprises document and/or device characteristics identification information (DIP), which is readable over a fieldbus when the field device is connected to an automation system and which unambiguously identifies electronic device documentation pertaining to the field device and/or characteristics thereof, and possibly to peripheral devices thereof.

15. A field device according to claim 14, **characterized** in that the field device (14, 15) configuration comprises a tag which includes a

link to corresponding device documentation residing in the centralized document server (DS).

16. A field device according to claim 14 or 15, **characterized** in that the information pertaining to the field device is readable over the link by means of a terminal device provided with a browser, for example over a wireless link by using a mobile station.

Fig. 1

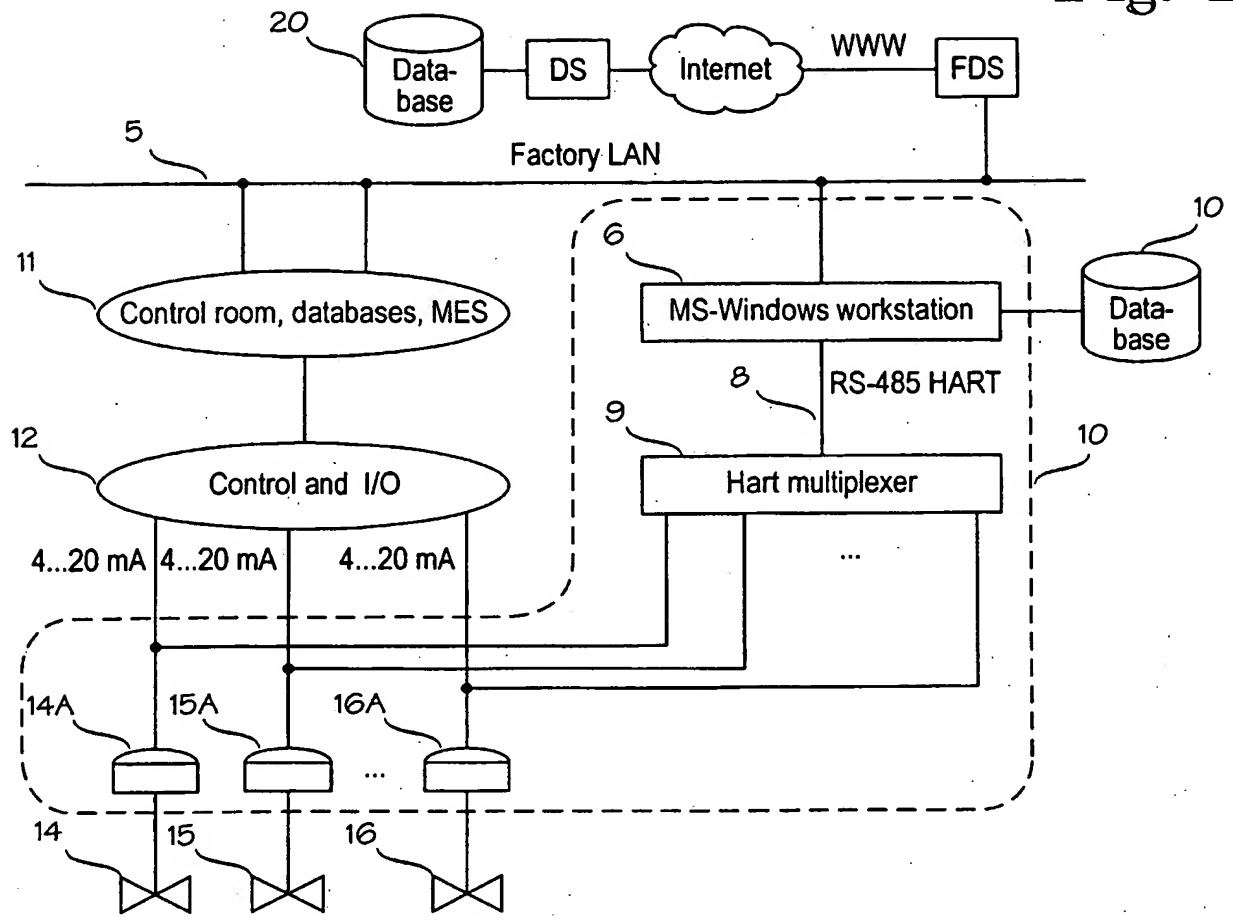

20
Data-base
DS
Internet
WWW
FDS
5
Factory LAN
10
6
11
Control room, databases, MES
MS-Windows workstation
Data-base
8
RS-485 HART
9
12
Control and I/O
Hart multiplexer
10
4...20 mA
4...20 mA
4...20 mA
14A
15A
16A
14
15
16

Fig. 2

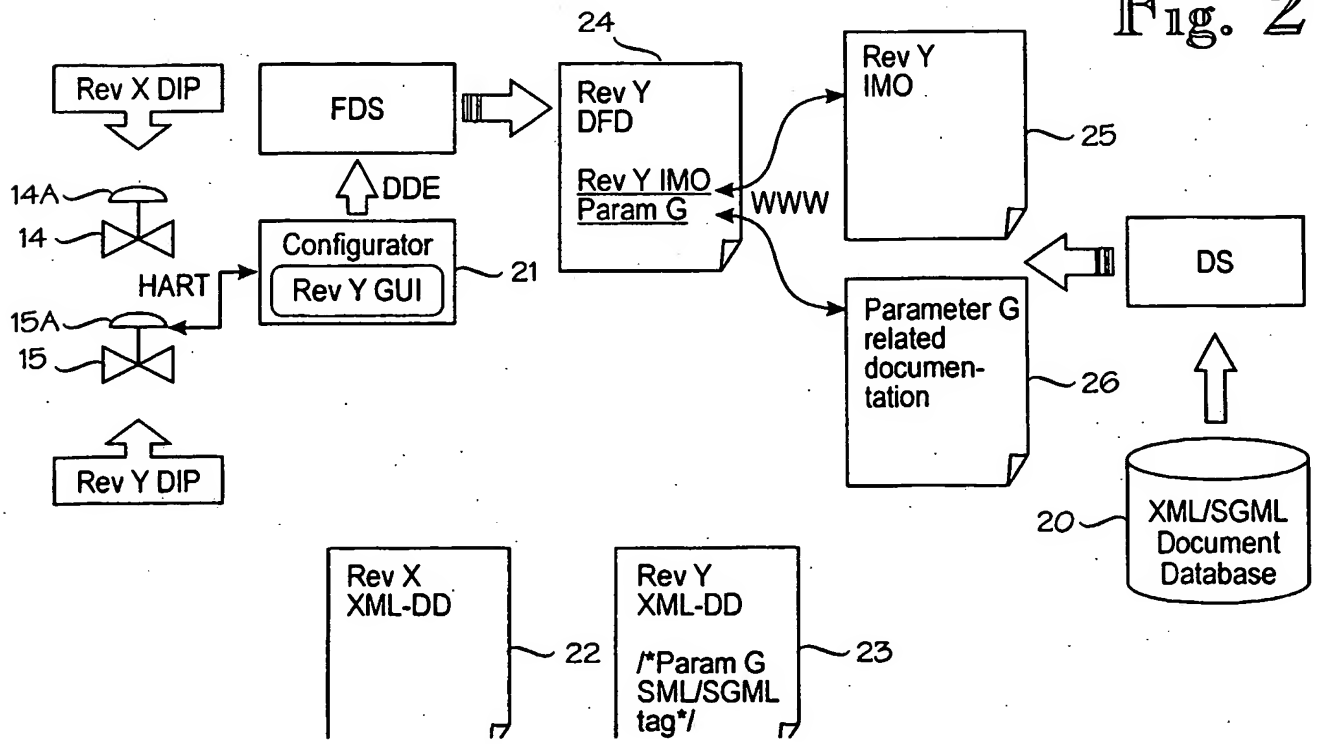

24
Rev X DIP
FDS
Rev Y DFD
Rev Y IMO
Param G
Rev Y IMO
25
WWW
DDE
14A
14
Configurator
Rev Y GUI
21
HART
DS
15A
15
Parameter G related documen-tation
26
Rev Y DIP
20
XML/SGML Document Database
Rev X XML-DD
22
Rev Y XML-DD
/*Param G SML/SGML tag*/
23

Fig. 3

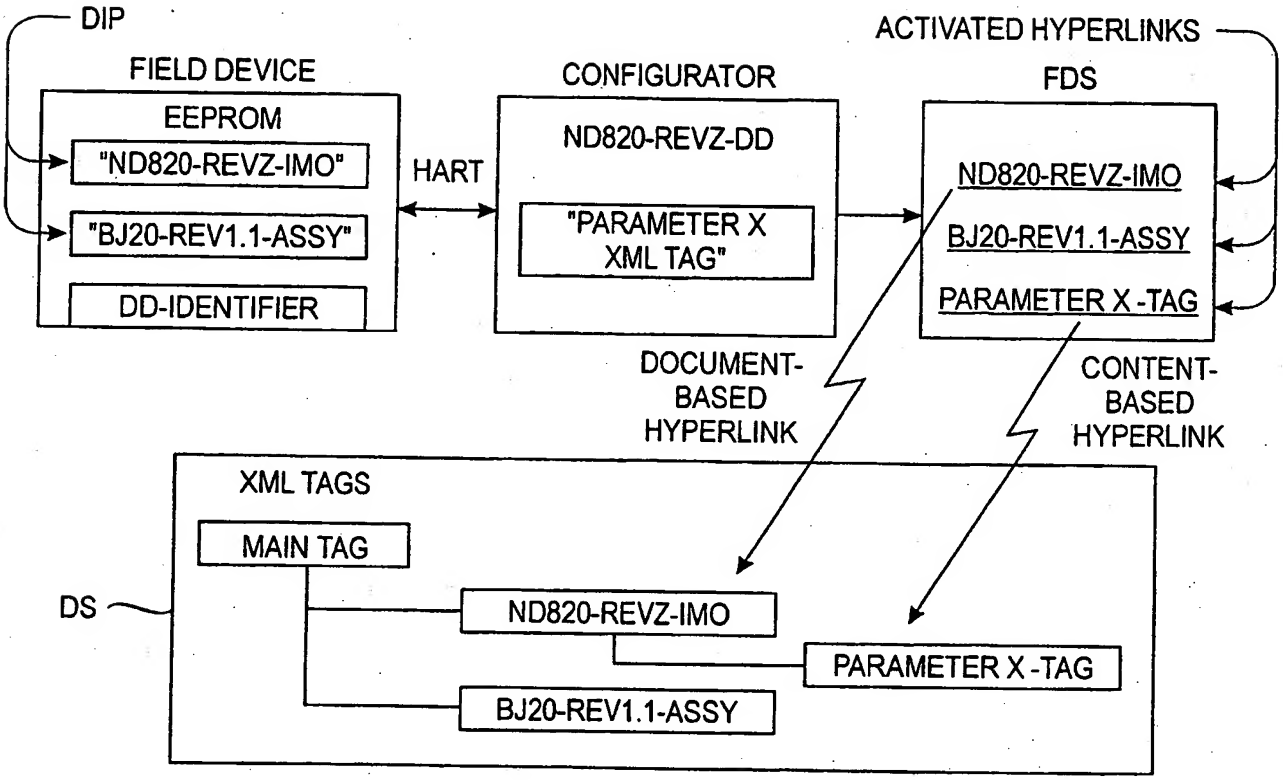
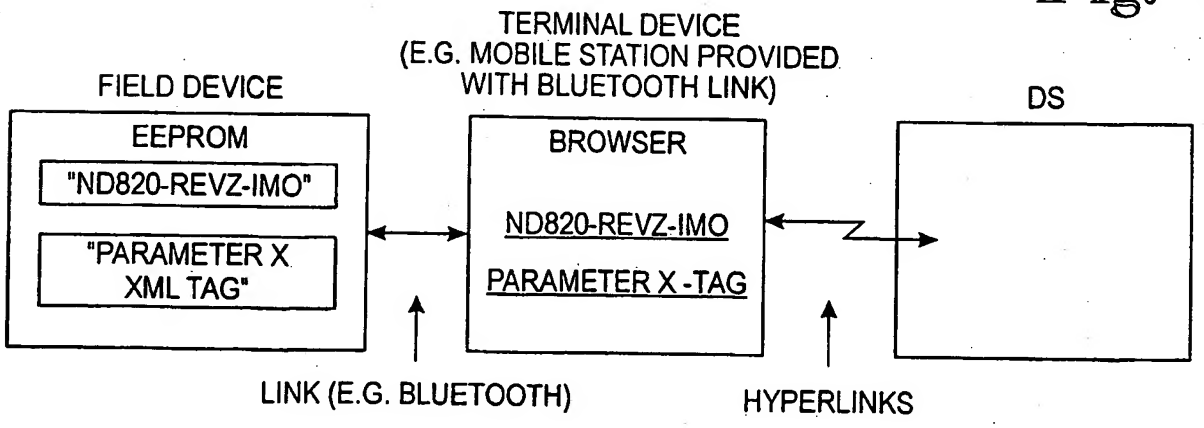


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 02/00240

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G05B 19/418, G06F 17/30
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G05B, G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LOHBECK, A. et al: Integration and management of fielddevices - FDT/DTM at a glance - From: Conference / Workshop on Component-Based Software Engineering. 23-24 August 2000 - ABB Corporate Research Center, Daettwil, Switzerland --	1-16
X	EP 0964325 A1 (NELES CONTROLS OY), 15 December 1999 (15.12.99) -- --------	1-16

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 August 2002	23 -08- 2002
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Oskar Pihlgren/LR Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/FI 02/00240

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0964325 A1	15/12/99	DE 964325 T	17/08/00
		FI 981235 A	02/12/99
		US 6298377 B	02/10/01